United States Environmental Protection Agency
Office of Air and Radiation Washington, DC 20460

EPA

OMS Advisory Circular

SUBJECT: Preparation and Shipment of Light-Duty Vehicles and Trucks to the EPA for Testing

I. Purpose

The purpose of this advisory circular (A/C) is to provide information to manufacturers of light-duty vehicles and light-duty trucks regarding:

1. The preparation of test vehicles--for both emission tests and for fuel economy tests--prior to delivery to the Motor Vehicle Emission Laboratory (MVEL) in Ann Arbor, Michigan,

2. The testing of vehicles prior to delivery to the MVEL,

3. The route by which test vehicles are to be driven to MVEL, and

4. The maintenance which may be performed on test vehicles in the event damage is incurred during shipment to the MVEL.

This advisory circular supersedes Advisory Circular No. 23A, which is obsolete and should be discarded.

II. Definition

Secondary laboratory: For the purpose of this advisory circular, a "secondary laboratory" is a laboratory other than the manufacturer's home testing facility. Such a laboratory may be owned by the manufacturer but located some place other than where mileage is normally accumulated on test vehicles. Such a laboratory may also be an independent test facility or one owned by another manufacturer.

III. Background

A. As provided in 40 CFR 86.091-29(a)(2), the Administrator may require submission of any one or more of the test vehicles selected for demonstrating compliance with emission standards, at such place or places designated by EPA, for the purpose of conducting emission tests. This provision is the basis for conducting emission tests at the MVEL.

B. 40 CFR 600.008-77(d) provides that the Administrator may require that any fuel economy data vehicle or certification vehicle be submitted at a place designated by EPA. This provision is the basis for conducting fuel economy tests at the MVEL.

C.1. The provisions of 40 CFR 86.091-23(a), as they relate to vehicles selected under the provisions of 40 CFR 86.085-24(b) and (c), require the manufacturer to conduct emission tests and submit these data to the Administrator.

2. In accordance with the provisions of 40 CFR 86.084-26(a), manufacturers located outside the Detroit area may conduct one complete emission test (including a highway fuel economy test --HWFET-- if applicable) at the home facility and another complete emission test at a secondary facility before delivering the vehicle to the MVEL. EPA encourages this practice because it reduces the number of problems resulting from apparent differences in emission levels attributable to altitude differences and/or void tests caused by shipment-related damage not detected during a visual inspection. Affected manufacturers need not obtain advanced approval to conduct these tests.

D. Test vehicles are routinely transported to EPA via truck and trailer. However, some manufacturers prefer to drive the vehicles on the road. The criteria for accumulating mileage for all test vehicles is provided in 40 CFR 86.084-26(a)(2) and permits the Administrator to approve a modified procedure. The provision to permit a modified procedure is the basis for approving the operation of a test vehicle on routes other than that specifically approved to conform to Appendix IV of 40 CFR Part 86.

E. On occasion, in-transit damage has occurred to test vehicles of both foreign and domestic manufacturers. The performance of any type of inspection and/or maintenance resulting from in-transit damage on vehicles selected in accordance with 40 CFR 86.085-24(b) and (c) is subject to approval in advance by the Administrator under the appropriate provisions of 40 CFR 86.088-25. Maintenance conducted on vehicles intended to comply with the provisions of 40 CFR Part 600 must be in accordance with the provisions of 40 CFR 600.006-89(b)(2)(i).

F. This A/C replaces A/C No. 23A which was published July 5, 1978. Various provisions of A/C No. 23A and its attachments have become either outdated or obsolete and are in need of updating. The significant changes are as follows:

1. With the introduction of distribution ignition systems, computer controlled engines, etc., the data required to be displayed on the vehicle (the window sticker) has changed.

2. Implementation of the video drivers aid (VDA) at MVEL has eliminated the need for manufacturers to supply premarked driving traces for vehicles equipped with manual transmissions. Driving schedules for manual vehicles are now entered into EPA's electronic data base.

3. Duplicate fuel tank thermocouples were required in A/C No. 23A. A second thermocouple was required as a back-up in the event the first thermocouple failed to operate properly. Recent experience has shown that certain thermocouple hardware, installation and care-of-hardware practices make the need for a back-up thermocouple unnecessary. Therefore, provisions have been added allowing manufacturers the option of installing one thermocouple provided the thermocouple is installed with hardware and procedures proven to be reliable.

4. A diagram illustrating required dimensions of the exhaust flange(s) has been included to eliminate the opportunity for misunderstanding. This flange design, introduced in July 1985, incorporates a gasket to prevent exhaust leaks.

IV. Applicability

This advisory circular is effective immediately and is applicable to all light-duty vehicles, light-duty trucks and light heavy-duty trucks (8,500 lbs. $\leq$ GVWR $\leq$ 10,000 lbs.) being certified with the light duty procedures.

V. Preparation of Test Vehicles

The appendix to this advisory circular lists the minimum preparation requirements for vehicles delivered to the MVEL in Ann Arbor for testing. These requirements are designed to facilitate testing of the vehicle by EPA personnel and provide maximum service to the manufacturer.

VI. Testing of Vehicles Prior to Delivery to EPA

A. A manufacturer, either domestic or foreign, may designate a secondary laboratory to test vehicles being shipped to the MVEL in Ann Arbor. Such laboratories must be described in the application for certification and may be used to conduct any test which would normally be conducted at the manufacturer's

home testing facility. The manufacturer is responsible for assuring that secondary laboratories conform to all of the regulations applicable to the manufacturer's home testing facility. Any test conducted at the designated secondary laboratory for vehicles selected under the provisions of 40 CFR 86.085-24(b) and (c) must be a complete emission test (including a HWFET if applicable) as specified in 40 CFR Part 86, and the test results are to be reported to EPA immediately after the test as required by 40 CFR 86.084-26(a)(6) and (a)(7).

B. Any test conducted on fuel economy test vehicles selected under the provisions of 40 CFR Part 600 must be reported to EPA in accordance with the applicable provisions of 40 CFR Part 600.

VII. Driving Route of Test Vehicles to EPA

If test vehicles are driven to the MVEL in Ann Arbor, mileage accumulated during such vehicle delivery is subject to the same limitations and requirements as specified in 40 CFR 86.084-26 and Appendix IV of Part 86. When the vehicle is driven 50 miles or less to the MVEL for testing, the vehicle may be driven on any convenient route, providing vehicle use is representative of normal in-use driving. Any vehicles driven from a distance greater than 50 miles must follow a route approved in advance by EPA. Approved routes must be described in the application for certification, with approximate average and maximum speeds specified, and a statement from the manufacturer that the prescribed route does not render the vehicle unrepresentative.

VIII. Maintenance on Test Vehicles following Shipment

A. For those test vehicles selected under the provisions of 40 CFR 86.085-24(b) and (c), maintenance may be performed, in accordance with 86.088-25(e)(1), (2) and (3), on certification vehicles after shipment to either a secondary laboratory or to the EPA laboratory, only with advance EPA approval. In accordance with §86.088-25(e)(4), if a vehicle is damaged in transit to a secondary laboratory or to the EPA laboratory, repairs may be performed only with advance EPA approval. If the need for such maintenance/repairs is first detected during the initial test by EPA, the results of the test will not be used as "official" emission data for that test point. Instead, the data from that test will be used as the "before maintenance" test with respect to any unscheduled maintenance allowed by the Administrator.

B. For those test vehicles selected under the provisions of 40 CFR Part 600 or voluntarily submitted, the provisions of 40 CFR 600.006-89(a)(2) are applicable.

Office of Mobile Sources

Attachments

8815b

APPENDIX TO A/C NO. 23B

Minimum Requirements for a Vehicle to be Accepted for Testing

A. General

1. Two sets of keys, clearly marked with vehicle make, identification number, and model, shall be provided with each test vehicle. Key identification tags should be no larger than 1 inch by 2 inches.

2. Information pertinent to the testing of the vehicle must be displayed in or on the vehicle in a manner that enables the data to be read from outside the vehicle. The information must appear on a window sticker affixed to a stationary window (i.e., the rear window on the driver's side). The following information must be listed:

Vehicle Identification Number
Vehicle Version Number[1]
Location of Fuel Tank Drainage Valve
Location of Fuel Filler Door Release
Basic Ignition Timing[2]
Method of Reading Basic Ignition Timing

Attachment A-1 is a format to be used for these data, and Attachment A-2 is a completed sample of A-1.

3. Any special operating instructions (e.g., starting, manual choke, dynamometer drive wheels, etc.) shall be submitted with each vehicle. This information is necessary to assist the laboratory personnel in preparing and driving the car. Attachment A-3 is intended to serve as a general guide for supplying this information.

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[1]Differences in vehicle versions (e.g., manual or automatic transmission, engine code changes, test weights, etc.) should be described in the "remarks" section of the vehicle information data sheet.

[2]If the ignition timing can be checked, the timing specification and method for checking the timing should be displayed on the window sticker. If the timing cannot be checked, this should be so stated on the sticker.

4. Each vehicle must have the appropriate shift schedule entered into the data base for the Video's Drivers Aid (VDA) System. The VDA electronically displays the driving trace previously used rolls of paper, preprinted with the driving trace. Refer to guidance letter CD-87-13 (dated October 28, 1987), for instructions on entering shift schedules into the VDA system.

5.a. Test vehicles should be delivered to and received by EPA no later than 8:00 a.m. of the day preceding the scheduled testing. However, vehicles should arrive no more than two days prior to scheduled vehicle preparation for testing.

b. The vehicle identification data should be defined and test number(s) assigned when the vehicle arrives for testing (i.e., well in advance of vehicle inspection).

6. Any vacuum lines, electrical connections, etc., which have to be disconnected to check for idle speed, ignition timing, etc., should be clearly labeled (e.g., colored tape, paint, etc.).

B. Items Associated with the Evaporative Emission Test

1. A drainage line, separate from the main fuel line, shall originate from the lowest point in the fuel tank(s). The drainage line shall incorporate a positive shut-off valve, and terminate in an accessible place (e.g., under the rear bumper, in the trunk, or near the fuel filler pipe). To facilitate drainage, the line shall end with either a 3/8 inch o.d. rigid tube or a quick disconnect similar to an Aeroquip Part No. 5602-8-105 (male) or 5601-8-105 (female).

2.a. Duplicate type J (iron-constantan), 0-500°F thermocouples shall be installed and be readily accessible, terminating in a male type J plug (Honeywell No. 30728096-001 or equivalent). The sensing end of the thermocouple shall be installed as near as possible to the volumetric center of the fuel when the tank contains 40 percent (tank fuel volume) of its nominal fuel tank capacity.

b(1) EPA will waive the requirement for the second thermocouple if the primary thermocouple is designed and installed with either of the following two methods: (1) a stainless steel-sheathed good quality thermocouple (type J) with a sealed male connector that enters the fuel tank through a metallic fitting which has been soldered to the fuel tank assembly; or (2) a good quality thermocouple (type J) with a sealed male connector that is solidly mounted to a bracket or the vehicle to prevent bending and tension on the wire leads. These two methods have proven to be reliable in use.

(2) When a manufacturer wishes to install only one thermocouple with a design/installation procedure that is different from either of the two described above, the manufacturer must show the design/procedure results in a statistically valid failure rate of less than one percent of testing performed at MVEL over a period of one year.

c. A manufacturer must receive advance EPA approval of their intent to install only one fuel tank thermocouple. Demonstrated reliability of the thermocouple design is the key element in our approval. EPA retains the right to reject vehicles which, upon an inspection of the vehicle, we feel have a strong likelihood of resulting in a void test due to a thermocouple failure.

3. EPA's fuel tank heating system controllers are compatible with heating pad type heating sources. (These controllers are not off-the-shelf type equipment. Technical details are available upon request.) If the fuel tank surface area is not easily accessible, the manufacturer is to install a fuel tank heating source which will allow fuel tank heating. This heating source (preferably a heating blanket) must comply with the provisions of 40 CFR 86.107-78(a)(4). Also, if the heating apparatus supplied with the test vehicle is electric, it shall be capable of operating on a 120-volt, 60 cycle alternating current and have a 10-foot power cord, ending in a (U.S.A.) conventional three-prong plug.

C. Items Associated with the Dynamometer Portion of the Test

1.a. The tailpipes of all vehicles must be equipped with a 2.5 inch stainless steel Marmon flange (Aeroquip/Servicemaster Part No. MFF61196-250S, or equivalent). Flanges must be permanently affixed and sealed to preclude leaks. The face of the flanges must project 3/8 inch beyond the end of the tailpipes as shown in attachment A-4 to ensure leak-tight connections with the EPA CVS flanges. Any deviation from this configuration which precludes proper mating with the MVEL CVS flange will result in rejection of the vehicle.

b. Flanges must extend far enough beyond the body of the vehicles to ensure adequate accessibility. Vehicles with dual exhaust systems must allow a minimum of 3 inches between flanges with faces parallel to facilitate coupling to the EPA CVS flanges.

2. When unconventional ignition systems are used which cause a normal electronic tachometer to read in error or give no reading, tachometers shall be supplied.

3.a. All front-wheel-drive vehicles shall have two sturdy, hold-down eyelets (2 1/2 inch i.d.) installed. The eyelets shall be located on each side of the vehicle forward of the front wheel centerline and at least 6 inches outboard of the vehicle centerline.

b. It will also be necessary or provide a minimum of one hold-down eyelet for those rear-wheel-drive vehicles which do not have bumpers adequate for restraining the vehicle.

VEHICLE IDENTIFICATION NUMBER	VEHICLE NAME

METHOD OF READING IGNITION TIMING

DIAGRAM OF IGNITION TIMING POINTER AND INDEX SCALE

Location of fuel tank drain valve

Location of fuel filler door release

Ignition Timing [ ] Drive [ ] Neutral

DIAGRAM OF EXTRA COOLING EQUIPMENT PLACEMENT

A-1 Format for Basic Data

VEHICLE IDENTIFICATION NUMBER	VEHICLE NAME
A72 - 1T88	Cleanmobile

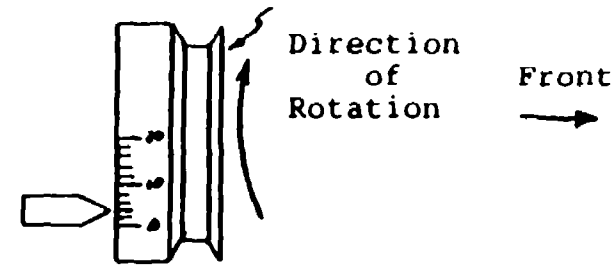
METHOD OF READING IGNITION TIMING

1. Disconnect vacuum line at distributor
2. Start engine and set idle speed at 800 ± 50 rpm
3. Read timing

Timing cannot be checked [ ]

DIAGRAM OF IGNITION TIMING POINTER AND INDEX SCALE

Harmonic Balancer Pulley



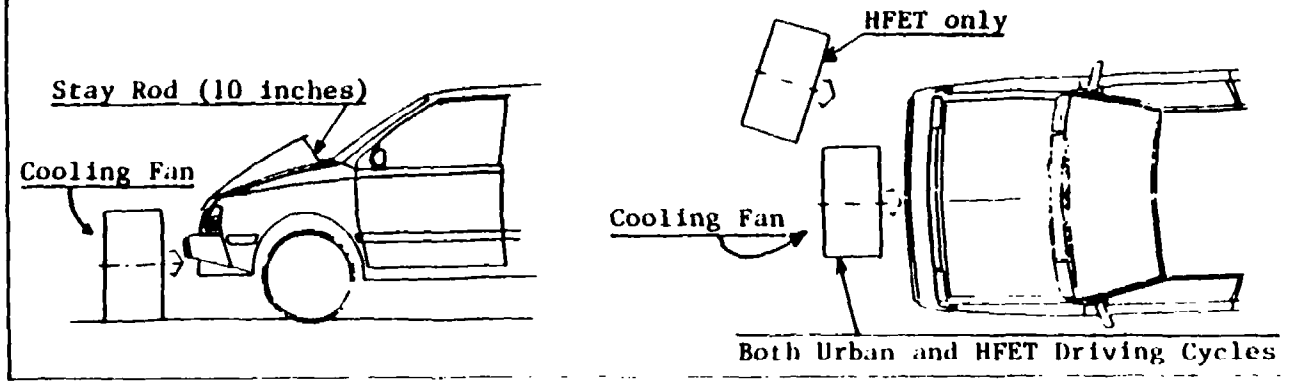
Each graduation equals 2°

LOCATION OF FUEL TANK DRAIN VALVE
Behind right corner of rear bumper

LOCATION OF FUEL FILLER DOOR RELEASE
Release inside glove box; door on driver's side

IGNITION TIMING 4° BTDC
[ ] Drive [X] Neutral

DIAGRAM OF EXTRA COOLING EQUIPMENT PLACEMENT



A-2 Completed Sample of Format for Basic Data

VEHICLE IDENTIFICATION NUMBER	VEHICLE NAME
A72 - 1T98	Cleanmobile

ENGINE STARTING: Automatic Transmission - Shift lever MUST be in P (Park) or N (Neutral) to start.

Manual Transmission - Clutch MUST be depressed to start.

Cold Engine Key "on" - Press accelerator to floor, release slowly, start engine by turning key to "start."

Hot Engine Key "on" - Press accelerator 1/4 to 1/2 of the travel and hold start engine by turning key to "start."

SHIFT PROCEDURE:

FTP and HWFET (Sample)

From	To	Speed
1	2	15
2	3	20
3	4	30
4	5	45

FTP: No downshift at power made (187 seconds).

HWFET: No downshift at power made at 296 seconds - M-4's only. For M-5, downshift to fourth gear at 296 seconds.

A-3 Sample Driver Information Sheet

Tail Pipe End Flange